

REMARKS

Claims 11-42 are pending and under consideration. Claims 14, 15, 20, 21, 26, 27, 32 and 33 were canceled. Claims 1-10 had been previously canceled.

Objections to the disclosure

The disclosure was objected to because the first paragraph disclosing “a furfuryl group” as a specific example of a hydrocarbon group for R¹ and R². Applicants submit that the objection has been obviated by the present amendment.

Rejections under 35 U.S.C. 112

Claims 11-42 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

In particular, the rejections alleges that for claims 11 and 29 the disclosure does not provide full support for the “n”, “n,n” and “n,n,n” designations in the group names. Such designations have been deleted by means of the present amended, and the rejection has been obviated.

Claim 29 was rejected because support was not found for an n-propylcyclohexyl group, an n,n-dipropylcyclohexyl group, an n,n,n-tripropylcyclohexyl group. Applicants submit that it would be obvious to one of ordinary skill in the art, in light of Compounds 9-27 and paragraphs [0033]-[0035] of the present application, to make compounds bearing one, two or three propyl groups as substituents on the cyclohexyl moiety, with the expectation that such compounds would have similar properties and could be used for the same purpose. Accordingly, it is respectfully submitted that the inclusion of such groups is adequately supported by the present disclosure.

Claim 11 was rejected because support was not found for an n-cyclohexylcyclohexyl group, an n-phenylcyclohexyl group or an n-tert-octylcyclohexyl

group. Although Applicants disagree, in order to advance prosecution, such groups have been deleted from the claims, thus obviating the rejection.

Claim 17 was rejected because, as defined in said claim, compounds of formula (I) in which each R^1 and R^2 is a methyl group are provided. By means of the present amendment, said compounds have been removed from the claimed subject matter, and the rejection has been obviated. Formula (II) as defined in claim 17 was also found to “provide[...] compounds [...] not explicitly disclosed in the original disclosure”. Applicants submit that the rejection has been obviated by the present amendment.

The support for the negative limitation “but do not form an interlocking macrocyclic compound” as recited in independent claims 23 and 29, was found to be not clear. Though Applicants disagree, in order to advance prosecution, said limitation has been removed by means of the present amendment.

Support for an n-isopropylphenyl group, as recited in the penultimate line of claim 23, was found to be not clear. Applicants submit that the rejection has been obviated by means of the present amendment.

Support for an n-tert-butylphenyl group, as recited in the last two lines of claim 29, was found to be not clear. Applicants submit that the rejection has been obviated by means of the present amendment.

Claims 11, 17, 23, 29, and 35-42 were rejected under 35 U.S.C. § 112, first paragraph, as failing to recite a pair of electrodes. Although Applicants disagree, in order to advance prosecution, it is submitted that the rejection has been obviated by means of the present amendment.

Claims 11-16, 23-36 and 39-42 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

In particular, claim 11 was rejected for requiring each of R^1 and R^2 to be a hydrocarbon group whereas the Markush group recites a “furfuryl group”. Applicants submit that the rejection has been obviated by means of the present amendment.

The use of “n”, “n,n”, “n,n,n” in claim 11 as set forth in the of n-methyl-, n,n-dimethyl, n,n,n-trimethyl, n-ethyl, n,n-diethyl and n,n,n-triethylcyclohexyl groups was found

to be confusing. Likewise, the use of “n-tert-octylcyclohexyl” was also found confusing. Applicants submit that the rejection has been obviated by means of the present amendment.

The use of “n” in “n-isopropylphenyl group” as recited in claim 23 was found confusing. Applicants submit that the rejection has been obviated by means of the present amendment.

The use of “n” in “n-tert-butylphenyl group” as recited in claim 29 was found confusing. Applicants submit that the rejection has been obviated by means of the present amendment.

Rejections under 35 U.S.C. 102(b)

Claims 17-22 were rejected under 35 U.S.C. § 102(b) as being anticipated by Forrest et al. (WO 99/53724). In particular, the rejection points to a hole-blocking layer comprising molecule “BCP” (See Forrest et al., p. 24), a molecule of Formula (II) wherein each of R⁴ and R⁵ is hydrogen. Applicants submit that said molecule has been deleted from the claims by means of the present amendment. The rejection is therefore moot, and removal thereof is respectfully requested.

Claims 17-19 and 21 were rejected under 35 U.S.C. §102(b) as being anticipated by Nakada et al. (EP 0564224), which sets forth an electron transfer layer comprising a compound of formula (II) wherein each of R⁴ and R⁵ is hydrogen. Applicants submit that said molecule has been deleted from the claims by means of the present amendment. The rejection is therefore moot, and removal thereof is respectfully requested.

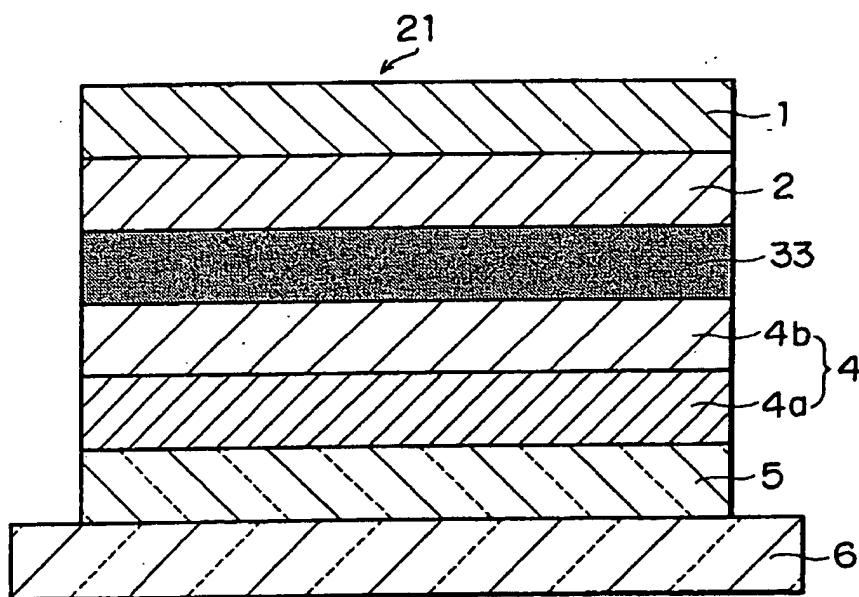
Rejections under 35 U.S.C. § 103(a)

Claims 37 and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Forrest et al. as applied to claims 17-22 above, and for further reasons stated in the rejection. Applicants submit that, as the above rejection of claims 17-22 is now moot, so is the present rejection of claims 37-38, and the removal thereof is respectfully requested.

Claims 11-13, 15, 23-25, 27, 29-31 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakada et al. (EP 0564224). Applicants respectfully submit that the cited reference teaches electroluminescent devices with different layers and a different structure than those set forth in the present claims.

The present claims are directed to electroluminescent devices of a structure such as that depicted in Figure 1 of the present application, as follows:

FIG. 1

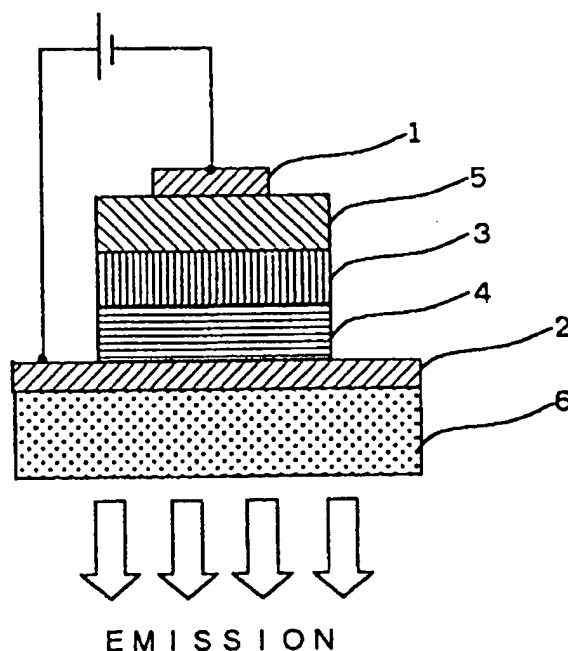


Such devices comprise substrate 6, anode 5, hole transporting luminescent layer 4, hole-blocking layer 33 comprising a bathopenanthroline, electron transport layer 2 and cathode 1 (See the publication of the present application, US Pat. Appl. Publ. 2004/0265626, pars. [0054]-[0057]). The provision of the hole-blocking layer 33 between the electron transport layer 2 and hole transporting luminescent layer 4 effectively controls the transport of the holes in the hole-blocking layer 33 so that the electron-hole recombination in the hole transport layer 4 is efficiently caused. Thus, blue light formation is promoted.

Without the hole-blocking layer, the electron-hole recombination occurs at the interface of the electron transport layer 2 and the hole transport layer 4 so that light emission with a long wavelength is promoted instead (*Ibidem*, pars. [0065]-[0066]).

The device taught by Nakada et al. is as follows, as illustrated in Fig. 2 of the cited reference:

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The device of Nakada et al. comprises substrate 6, anode 2, hole transport layer 4, emitting layer 3, electron transport layer 5 and cathode 1. Electron transport layer 5 may contain, inter alia, betaphenanthroline molecules (See page 2, ll. 23-42). Such a device is allegedly characterized by a high durability and high luminance (See Abstract, Fig. 6).

However, the device of Nakada et al. differs from that of the claims as presently amended in that they are structurally different, as Nakada et al. does not include a hole-blocking layer. Even though Nakada et al. teaches the inclusion of betaphenanthrolines, said molecules are included in electron transport layer, as opposed the hole-blocking layer as in the claimed devices. Consequently, the device of Nakada et al. emits light from emitting layer 3, whereas the claimed devices emit light mainly from the luminescent hole transport layer 4 which is also absent from Nakada et al.

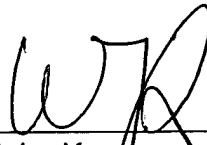
Accordingly, the device of Nakada et al. and those of the claims as presently amended are structurally different, and the layers comprising betaphenanthrolines carry different functions respectively leading to emission of light from respectively different layers.

In addition, a person of ordinary skill in the art at the time of the invention would not have known from Nakada et al. that betaphenanthrolines can be used in hole-blocking layers, and that the presence of such a layer would yield a structure with the luminescent hole transport layer of the claimed devices. There would therefore be no motivation to modify the structure of Nakada et al. to obtain the devices of the present invention. In light of the foregoing, Applicants respectfully submit that the rejection is improper and should be removed.

Conclusions

In view of the foregoing, it is submitted that all the claims are allowable and that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,



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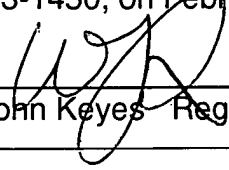
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